Life In New Hampshire Salt Marshes:

A Quick-Reference Field Guide

New Hampshire Department of Environmental Services
Coastal Program

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- Tiner, Ralph W. "A Field Guide to Coastal Wetland Plants of the Northeastern United States," 1987.

- Fish descriptions taken from "Fishes of the Gulf of Maine" Fisheries Bulletin 74; Vol 53, Henry B. Bigelow and William C. Shroeder http://www.gma.org/fogm/Default.htm

A Note About This Publication

This field guide is not intended to be a comprehensive listing of all plant and animal species which inhabit New Hampshire salt marshes. Hopefully, it will provide the casual observer with aid in identification of the most frequently encountered species and references to assist in further, more detailed studies for those wishing to know more about salt marsh ecosystems.

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Introduction

Salt marshes serve as the transition from the ocean to the land; where fresh and salt water mix. Salt marsh plants are salt tolerant and adapted to water levels that fluctuate with the tide. Tides carry in nutrients that stimulate plant growth in the marsh and carry out organic material that feeds fish and other organisms. Over time, salt marshes accumulate organic material into a dense layer called peat.

Salt marshes are among the most productive ecosystems on earth, rivaling that of an Iowa cornfield. The position of salt marshes on the landscape and their productivity makes them important not only as a part of the natural world but also to humans today. There are about 6,200 acres of salt marsh in New Hampshire, many of which have been damaged by restricted tidal flow, filling, ditching, and increased freshwater flows. Restoration is necessary because salt marshes are important for the following reasons:

Nursery Area for Fish, Crustacea, and Insects

We know that the productivity of a corn field goes to feed humans and livestock, so where does the productivity of salt marshes end up? Research increasingly points to aquatic wildlife as the main recipients of this production. The vegetation is broken down by bacteria and small insects. The resulting decayed plants are eaten by larger insects, fish, and mussels. These animals reside in the marsh soils, ditches, and small ponds where they are protected from predators. That is until the tide comes in and predators are able to locate and eat the smaller critters. Thus, the salt marsh provides the food for larger fish that are the heart of the New England fishing industry. Over the past decade, fishery stocks in New England have seriously declined. There is evidence that restoring marshes, along with fishing regulations, will help to restore these fish stocks.

Protection Against Waves and Sea Level Rise

Over the past 6,000 years, the ocean has risen many feet in elevation. It is not uncommon to dig in a saltmarsh and find the stumps of cedar trees preserved underneath. Because saltmarshes trap nutrients and sediment, they are able to grow and keep pace with the rising ocean. This process of soil formation is called accretion. Current forecasts call for the sea level to rise at least another foot in the next 100 years. The salt marshes will keep pace with this rise if we let them. The marshes slow the velocity of waves before they reach land and mitigate storm surges. In places where marshes have been destroyed, winter storms are more damaging.

Mosquito Control

Since World War II, people have drained marshes to both harvest saltmarsh "hay" for cattle and control mosquitoes. In many areas, this practice of mosquito control is ineffective and counterproductive. When marshes are drained, they subside and break apart creating more mosquito habitat. Over time, the ditches fill back in causing more stagnant water. Also, the introduction of tide gates results in freshwater ponding, which simply causes freshwater mosquitoes to replace the saltwater species. Restoring marshes dramatically increases fish populations that control the mosquitoes.

Plant Zonation In Northeastern Salt Marshes*

Salt marshes can be extremely difficult places to live because of wide daily fluctuations in salinity, water, temperature, and oxygen. Few plants have evolved adaptations to cope with the extreme conditions of salt marshes. Plant zonation in a salt marsh results from species-specific adaptations to physical and chemical conditions. Looking out on a healthy salt marsh in full summer growth, one can observe distinct zones of plant growth. Bands of tall grasses inhabit the saturated banks of creeks and bays, and this zone is bordered by a flat "meadow" of grasses and sedges that may extend landward for a great distance before transitioning into upland habitats where there is a greater diversity of shrubs, flowering plants, and grasses.

Low Marsh: The low marsh is located along the seaward edge of the salt marsh. It is usually flooded at every tide and exposed during low tide. It tends to occur as a narrow band along creeks and ditches, whereas the high marsh is more expansive and is flooded less frequently. The predominant plant species found in the low marsh is the tall form of *Spartina alterniflora* (smooth cordgrass). This species can reach a height of six feet and is very tolerant of daily flooding and exposure.

High Marsh: The high marsh lies between the low marsh and the marsh's upland border. It can be very expansive in some areas, sometimes extending hundreds of yards inland from the low marsh area. Soils in the high marsh are mostly saturated, and the high marsh is generally flooded only during higher than average high tides. Plant diversity is low (usually less than 25 species), with the dominant species being the grasses and rushes such as *Spartina patens* (salt hay grass), *Distichlis spicata* (spike grass), *Juncus geradii* (black grass), and the short form of *Spartina alterniflora*. Other plant species commonly found in the high marsh are *Aster tenufolius* (perennial salt marsh aster), and *Limonium nashii* (sea lavender).

Pool/Panne: Pannes are shallow depressions located within in the high marsh. They hold standing water and typically dry out during extended dry periods, such as at the end of the summer season. Salinity can reach extremely high concentrations in pannes and only the most salt-tolerant species can exist at panne edges including *Salicornia spp.* (glassworts), *Plantago maritima* (seaside plantain), and the short form of *Spartina alterniflora*, as well as some blue-green algae. There are some larger, deeper, and more permanent depressions (called pools) in the high marsh that can be vegetated with submerged aquatic species such as *Ruppia maritima* (widgeon grass) and are inhabited by saltmarsh fish. Both pools and pannes (when not entirely dried out to cracked dry mud) are very valuable habitat for migratory water birds.

Marsh Border: The marsh border is located at the salt marsh's upland edge and other isolated areas on the marsh where elevations are slightly above the high marsh. The marsh border is usually only flooded at extreme astronomical tides and under irregular conditions such as storm surges or wind-driven tidal inundations, and does not experience waterlogged conditions or severe salt stress. A high diversity of herbs, shrubs, and even trees exists in the marsh border. *Iva frutescens* (marsh elder), *Myrica gale* (Sweet Gale), *Solidago sempirvirens* (seaside goldenrod), and *Panicum virgatum* (switchgrass) are just some of the many marsh border plants.

* Information taken directly from "A Volunteer's Handbook for Monitoring New England Salt Marshes." Carlisle, B.K., A.M. Donovan, A.L. Hicks, V.S. Kooken, J.P. Smith, and A.R. Wilbur. 2002. Massachusetts Office of Coastal Zone Management, Boston, MA.

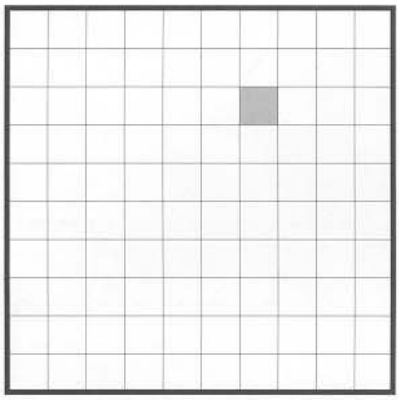
Common NH Salt Marsh Plant Common Names, Scientific Names, and Abbreviations

Common Name	Scientific Name	Abbrev	Common Name	Scientific Name	Abbrev
Baltic Rush	*Juncus balticus*	JB	Saltmarsh Aster	*Aster tenufolius*	AT
Black Grass	*Juncus gerardii*	JG	Saltmarsh Bulrush	*Scirpus maritimus*	SM
Broad-Leaf Cattail	*Typha latifolia*	TL	Saltmarsh Bulrush	*Scirpus robustus*	SR
Bushy Knotweed	*Polygonum ramoissium*	PR	Saltmeadow Grass	*Spartina patens*	SP
Common Glasswort	*Salicornia europaea*	SE	Saltwater Cordgrass	*Spartina alterniflora*	SA
Common Reed	*Phragmites australis*	PA	Sea Blite	*Sueda linearis*	SL
Glossy Buckthorn	*Rhamnus europaea*	RE	Sea Lavender	*Limonium nashii*	LN
Halberd-Leaved Tearthumb	*Polygonum arifolium*	PAR	Seashore Alkali Grass	*Puccinellia maritima*	PUM
Hedge Bindweed	*Convolvus sepium*	CS	Seaside Arrow Grass	*Triglochin maritimum*	TM
Jewelweed	*Impatiens capensis*	IC	Seaside Goldenrod	*Solidago sempervirens*	SS
Marsh Elder	*Iva frutescens*	IF	Seaside Plantain	*Plantago maritima*	PM
Marsh Orach	*Atriplex patula*	AP	Sensitive Fern	*Onoclea sensibilis*	OS
Meadowsweet	*Spiraea latifolia*	SPL	Silverweed	*Potentilla anserina*	PAS
Narrow-Leaf Cattail	*Typha angustifolia*	TA	Slough Grass	*Spartina pectinata*	SPE
Northern Bayberry	*Myrica pensylvanica*	MP	Speckled Alder	*Alnus rugosa*	AR
Olney Three Square	*Scirpus olneyii*	SO	Spike Grass	*Distichlis spicata*	DS
Overlooked Hedge Hyssop	*Gratiola neglecta*	GN	Sweet Gale	*Myrica gale*	MG
Poison Ivy	*Toxicodendron radicans*	TR	Switchgrass	*Panicum virgatum*	PV
Purple Loosestrife	*Lythrum salicaria*	LS	Tall Meadow Rue	*Thalictrum pubescens*	TP
Red Fescue	*Festuca rubra*	FR	Unknown Species	*Unknown species*	UK
Reed Canary Grass	*Phalaris arundinacea*	PHA	Virginia Creeper	*Parthenocisis quinquefolia*	PQ
Rugosa Rose	*Rosa rugosa*	RR	Widgeon Grass	*Rupia maritima*	RM

Salt Marsh Vegetation Survey

Standard Cover Classes and Midpoints for Estimating Abundance

One method for obtaining abundance values is to estimate the percent of a plot occupied by the target plant. To assess percent cover, one estimates the area of the plot frame ($1m^2$) that is covered by all of the leaves, branches, and stems of the target species. Since visual estimates may vary from one person to another, standard cover classes and midpoint abundance values are used to reduce variability. The following figures illustrate nine standard cover classes. For each plot, first identify and list the species present, then for each species determine which figure best describes its cover. Record the midpoint value on the data sheet.



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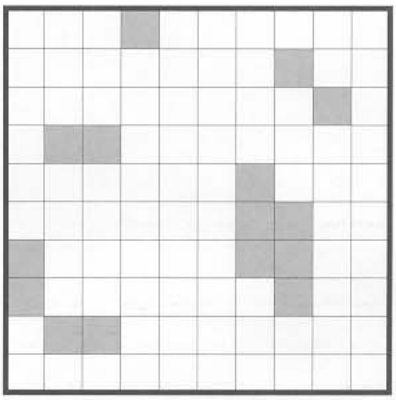

(11% to 19%)

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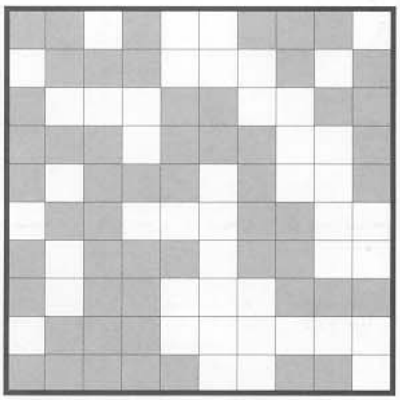

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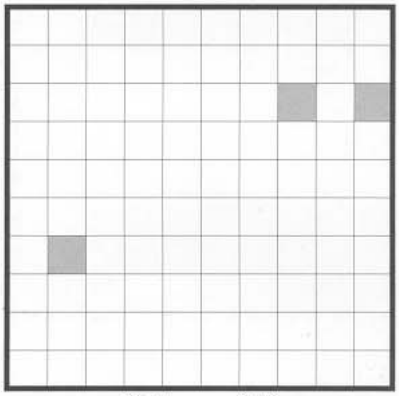

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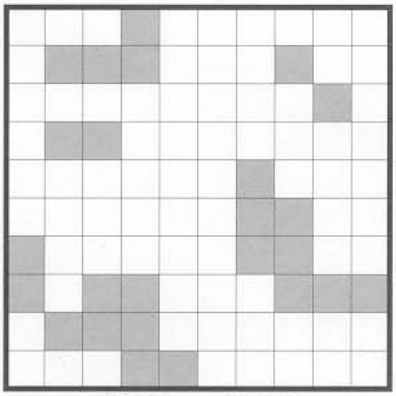

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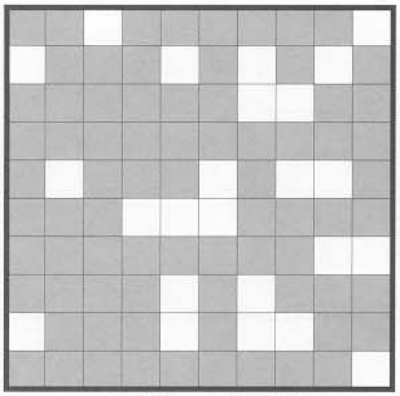
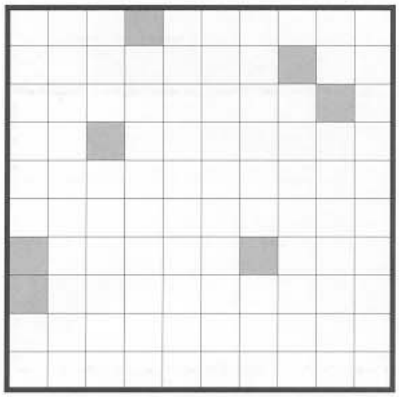


(65% to 87%)

Use midpoint 76%



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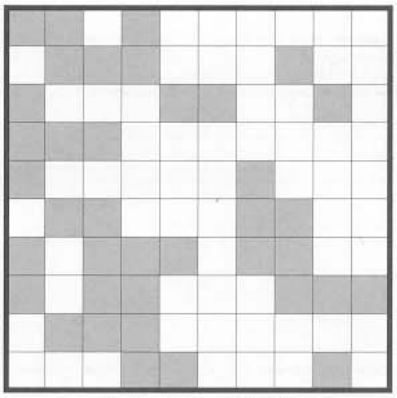
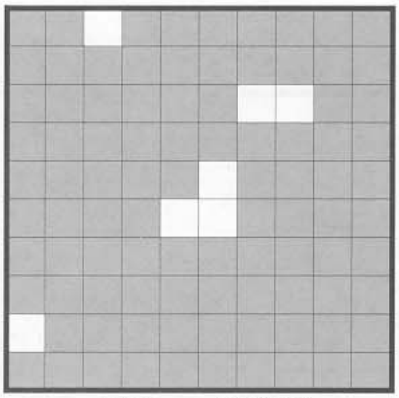


(31% to 45%)

Use midpoint 38%



(88% to 100%)

Use midpoint 94%

GRASSES, RUSHES, & SEDGES

BALTIC RUSH
Juncus balticus

Height: Medium-height (1 ½ - 3 feet tall). Soft stems are unbranched and round in cross-section.

Leaves: Leaves are sheaths up to 5 inches long and have a fine, pointed tip.

Flowers: Grow in clusters and arising from a single point on the upper half of the stem. Flowers late May into September.

Habitat: Sandy salt and brackish marshes (irregularly flooded zone) and dunes.

Value: Bases and roots provide food for muskrat and moose. Seedheads and young plants provide food for wildfowl, upland gamebirds, marshbirds, and songbirds.

Similar Species: Soft Rush (*Juncus effusus*) does not generally occur in brackish marshes, but may be present where there is freshwater influence. Black Grass (*Juncus gerardii*) occurs in saltmarshes but its stem bears conspicuous leaves and is not soft.

BLACK GRASS
Juncus gerardii

Height: Low to medium height (usually 8-24 inches tall).

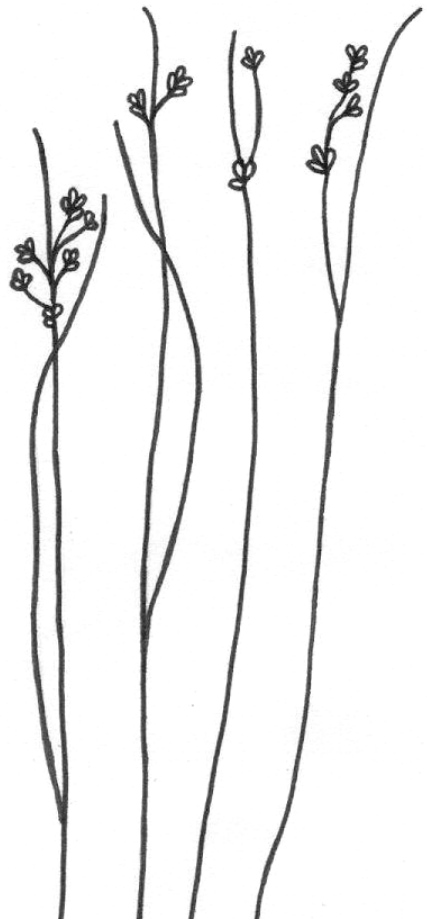
Leaves: One or two long leaves (up to 8 inches long).

Flowers: Dark-brown with yellowish stripes growing on an erect, branched stem. Flowers June into September.

Habitat: Irregularly flooded saltmarshes, usually at upper elevations. Occasionally found in brackish marshes and is either associated with *Spartina patens* or forming pure stands in cowlicked mats.

Value: Provides food for waterfowl and upland birds. Attracts marsh and songbirds. Roots may be eaten by muskrat and moose.

Similar Species: Canada Rush *(Juncus canadensis)* grows in similar habitats but is taller (1-3 ft).



NARROW-LEAF CATTAIL
Typha angustifolia

Height: Medium to tall height (3-5 feet tall).

Leaves: Simple, elongate, linear leaves are flattened and ascend along the stem. Usually less then 10 leaves.

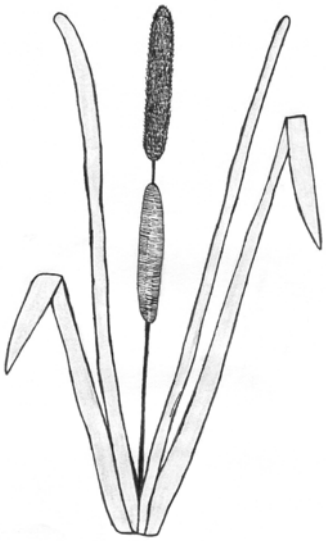
Flowers: Grow at the top of a long stalk and arranged in two separate cylinder-shaped spikes (male spike above female spike separated by a space). Flowers late May through July.

Habitat: Brackish and tidal fresh marshes. When found on salt marshes, it may be an indication of restricted freshwater drainage or increased stormwater runoff.

Value: Seeds and rootstock of both Narrow-Leaf Cattail and Broad-Leaf Cattail provide food for muskrat and beaver, and provide cover and nesting for wood ducks, marsh wren, and the red-winged blackbird.

Similar Species: Broad-leaved cattail *(Typha latifolia)* grows taller (up to 9 feet), has wider leaves (up to 1 inch) and has no space between male and female spikes.

Broad-Leaf Cattail



Narrow-Leaf Cattail

PRAIRIE CORDGRASS/SLOUGH GRASS

(A.K.A Fresh-Water Cordgrass)

Spartina pectinata

Height: Medium to tall height (3-6 ½ feet tall). Stems round and hollow.

Leaves: Very long leaves (up to 4 ft) with very rough edges that taper to a threadlike tip. When dry, leaves may roll inward.

Flowers: Clusters (up to 1 ½ feet long) usually have fewer than 20 branches, all similar lengths. The two lower scales of each spikelet is usually bristle-tipped.

Habitat: Irregularly flooded brackish marshes and the upper borders of salt marshes, where fresh water runoff influences its distribution.

Value: Rootstalks and seeds provide food for waterfowl, marshbirds, shorebirds, songbirds, and aquatic and terrestrial furbearers. Also provides nesting for the marsh wren.

Similar Species: Salt meadow cordgrass *(Spartina patens)* is usually found at lower elevations in the high marsh and is a much smaller version of this species. They are closely related and can hybridize to produce an intermediate form.

Courtesy of Alyson Eberhardt

SPIKE GRASS/SALT GRASS
Distichlis spicata

Height: Low height (8-16 inches tall or usually < 2 ft).

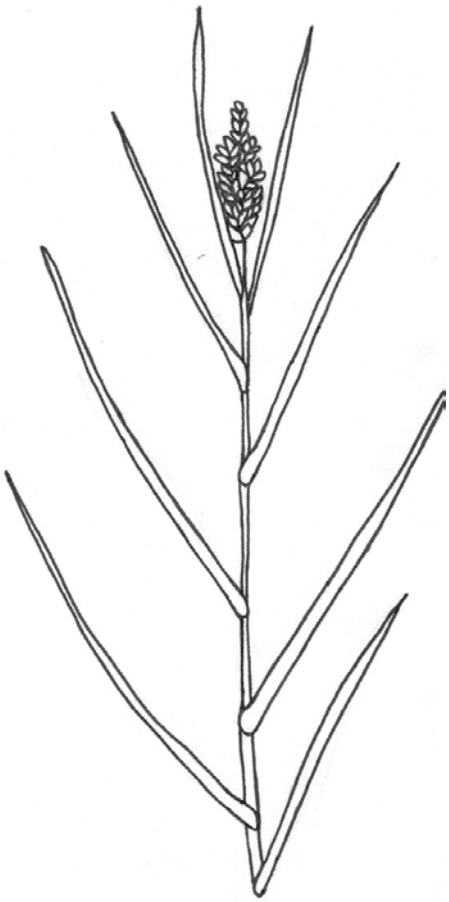
Leaves: Numerous linear, distinctly two-ranked leaves with smooth margins usually rolled inwardly and overlapping.

Flowers: Yellow clusters flowering from August into October.

Habitat: Irregularly flooded salt marshes, often growing in association with *Spartina patens* in the high marsh, or in pure dense stands in wet depressions.

Value: Provides nesting cover and food for waterfowl. The seeds, plants, and roots are eaten by ducks, geese, shore birds, small mammals, and deer.

Similar Species: Can be confused with Black Grass (*Juncus gerardii*) or Saltmeadow Cordgrass *(Spartina patens)* when not in bloom. The leaf blades on Spike Grass, however, are longer and bluish-green in color and distinctly two-ranked or arranged nearly on opposite sides of the stem. The stem of Spike Grass is lighter in color when it emerges from each leaf.



SMOOTH CORDGRASS
Spartina alterniflora

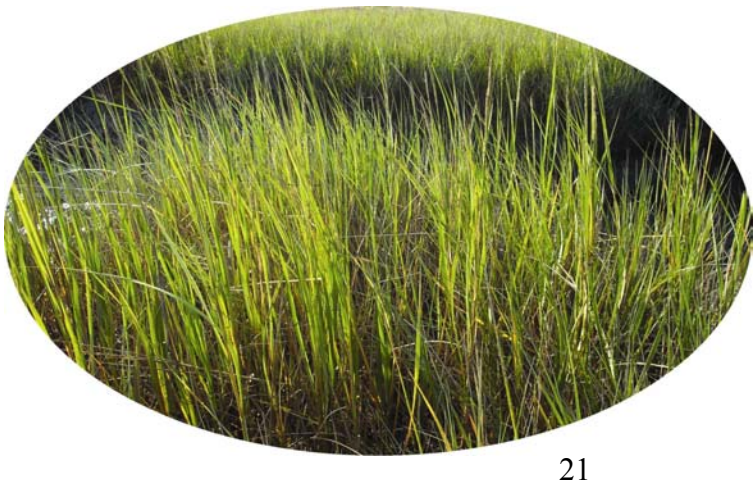
Height: Low to tall height (1-6 feet tall).

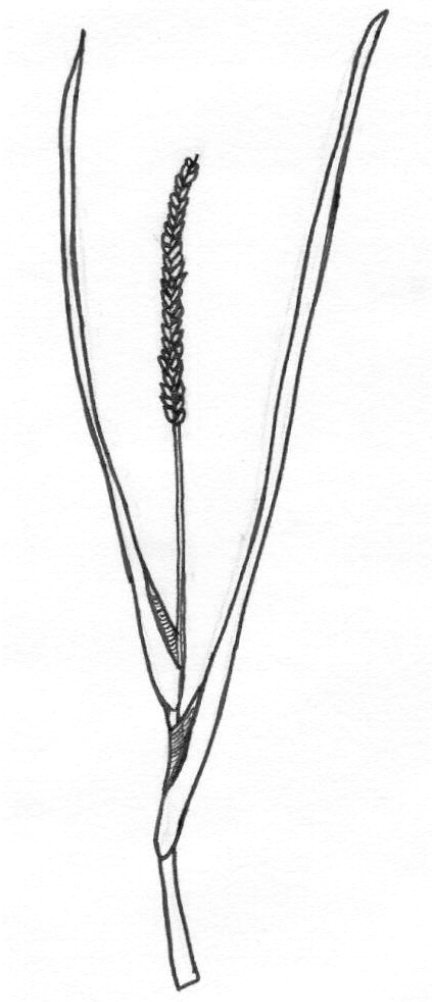
Leaves: Long, smooth leaves tapering to a long point with inwardly-rolled tip. Leaf margins smooth or weakly rough.

Flowers: Grow in floral spikes to a foot long, usually with long, upright branches. Flowers July through September.

Habitat: Tall form found regularly in the low marsh. Short form found in irregularly-flooded zones of the high marsh, especially near edges of salt pannes.

Value: Entire plant used by birds, fish, shellfish, and other tide-water invertebrates and mammal species inhabiting a salt marsh. Seeds and roots are a significant food source for waterfowl. This plant is also a primary value as an erosion-control defense and absorption of storm-wave energy. The dead and decomposing stems and leaves are a primary source of detritus in a salt marsh ecosystem.





SALT MEADOW CORDGRASS

(A.K.A Salt Hay Grass)

Spartina patens

Height: Low to medium height (1-3 feet tall).

Leaves: Very narrow linear leaves with margins rolled inwardly.

Flowers: Borne in clusters to 8 inches long, usually with 3 to 6 branches. Flowers from late June into October.

Habitat: Found regularly in high marsh. Often forms cow-licked mats.

Value: Provides food for shellfish and other tide-water invertebrates, ducks, geese, shore and marsh birds, deer, and small mammals. Builds peat, creating flat meadows. Erosion and storm damage control.

SWITCHGRASS
Panicum virgatum

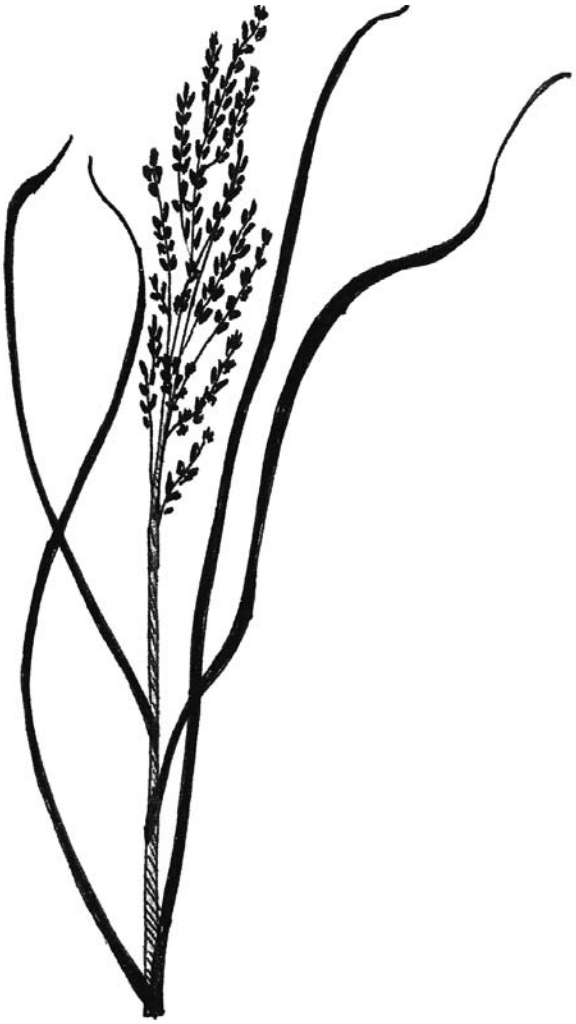
Height: Medium to tall height (Up to 6 ½ feet tall) forming dense clumps.

Leaves: Long, tapered leaves sometimes with few hairs at base.

Flowers: Many spikelets on slender stalks. Flowers July through September.

Habitat: Upper borders of salt marshes and irregularly flooded brackish marshes, sand dunes, shores.

Value: Seeds and young foliage provide food for waterfowl, wild turkey, red-winged blackbird, sparrows. Plants provide food for muskrat, rabbit, and deer.



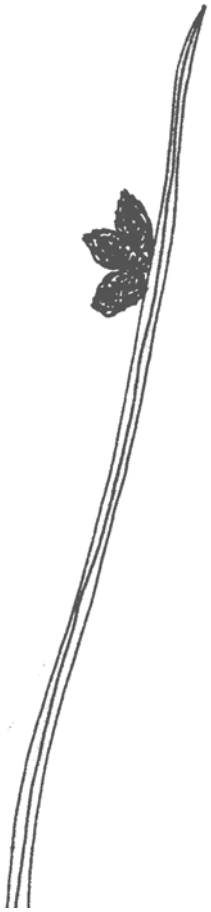
OLNEY THREE-SQUARE
(A.K.A Chair-Maker's Rush)
Scirpus olneyii

Height: Medium to tall height (usually around 3 ft tall but can grow up to 7 feet tall). Stems stout and triangular shaped.

Flowers: Brown spikelets are blunt-tipped. Flowers June through September.

Habitat: Irregularly flooded brackish marshes and upper borders of salt marshes.

Value: Seeds and rhizomes provide food for many bird species.



SALTMARSH BULRUSH
Scirpus robustus

Height: Medium height (3-4 fttall). Stems short and triangular.

Leaves: Elongate, linear, and grasslike leaves taper to a long point.

Flowers: Mature spikelets usually reddish-brown, and the bristle tips of their scales recurved. Flowers July to October.

Habitat: Irregularly flooded brackish marshes and upper borders of salt marshes.

SEASHORE ALKALI GRASS
Puccinellia maritima

Height: Low to medium-height (8-32 inches tall). Stems are hollow and round.

Leaves: Two-ranked leaves are less than a ½ inch wide and often rolled inward.

Flowers: Terminal inflorescence is narrow with ascending branches bearing spikelets with 4-11 flowers. Flowers June into September.

Habitat: Irregularly flooded saltmarshes and shores.

SOFT-STEMMED BULRUSH
Scirpus validus

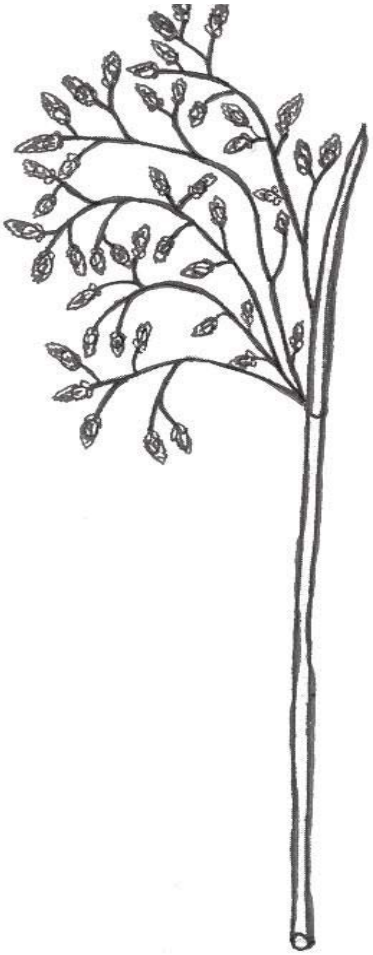
Height: Tall (usually 5 ft tall, but can grow up to 10 feet tall).

Leaves: Soft, round stem tapers to a point. Usually grayish-green with no apparent leaves.

Flowers: Many-stalked budlike spikelets covered by reddish-brown scales located immediately below the top of stem. Clusters mostly drooping. Flowers June into September.

Habitat: Irregularly flooded brackish marshes and upper borders of salt marshes.

Value: The seeds are eaten by waterfowl.



Courtesy of Vic Ramey 2001
University of Florida

COMMON REED
Phragmites australis

Height: Tall, erect grass (4-14 ft tall) usually forms dense stands.

Leaves: Grayish-green, close to each other and usually sticking out from stems at a big angle, up to 2 feet long and 1 inch wide.

Flowers: Clusters ½ - 1 foot long, often purple when young (as shown), usually whitish and fluffy when old. Flowers Late July to October.

Habitat: Irregularly flooded brackish marshes and upper borders of salt marshes. Also found in ditches and disturbed areas.

MOST STANDS OF THIS PLANT ARE EXOTIC AND INVASIVE!

Courtesy of Alyson Eberhardt

How To Distinguish Native From Non-Native *Phragmites*

Stems: Non-native stems are typically green (but may have a little purple color along the nodes). Native stems have some purple color where tissue is exposed and are often shiny. Black spots often appear on native stems late in the growing season.

Leaf Collars: Leaf colors on the non-native variety are always green, while leaf collars on native stems may be purple.

Leaf Sheaths: On dead stems, the leaf sheaths on the non-native variety remain attached. Leaf sheaths on native stems are lost or very loosely attached. This is the best indicator based on morphology that distinguishes native or introduced varieties.

FLOWERING PLANTS

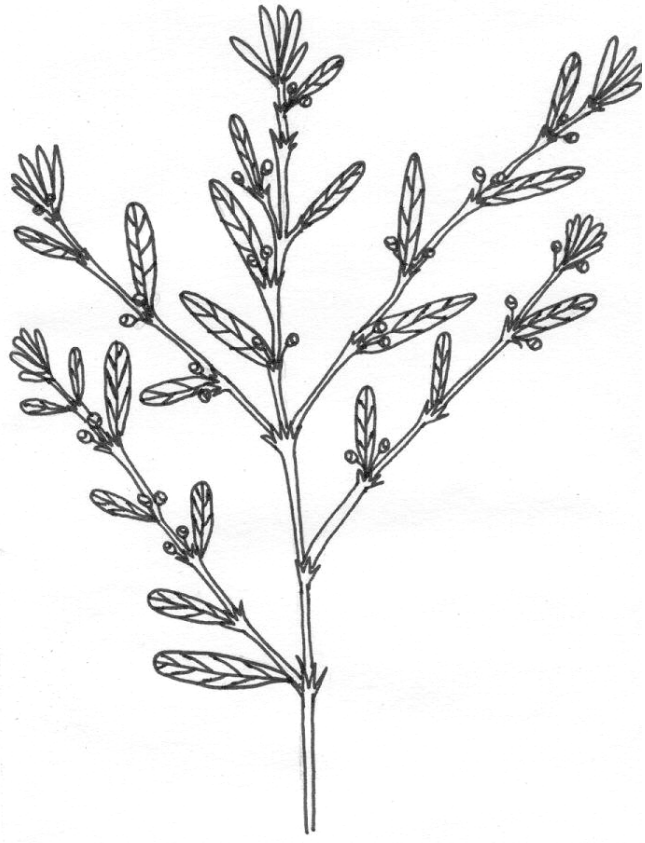
BUSHY KNOTWEED
Polygonum ramossimum

Height: Low to medium height (1-3 ½ ft tall). Stems jointed, sheathed above the joints, with many ascending branches.

Leaves: Alternate, linear or narrow lance-shaped yellow-green leaves tapering at both ends.

Flowers: Small, yellow-green flowers sometimes with pink margins that grow on stalks and are dwarfed by its leaves. Flowers July through October.

Habitat: Sandy coastal beaches and edges of saltmarshes.



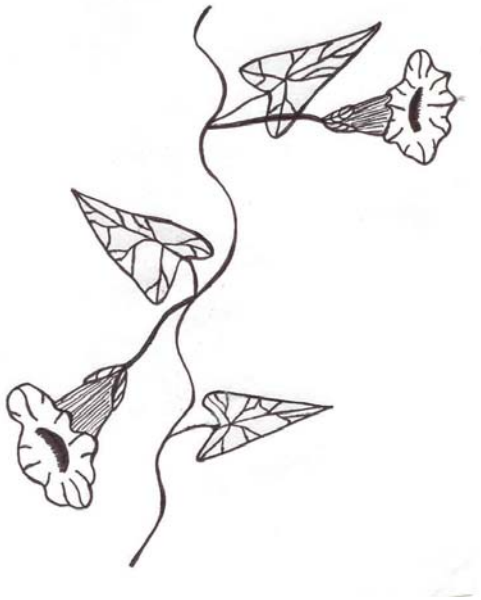
HEDGE BINDWEED
Convolvulus sepium

Height: Smooth, twining vine (growing up to 10 feet long).

Leaves: Triangular-shaped.

Flowers: Funnel-shaped flowers, pinkish with white stripes. Resembles Morning Glory. Flowers mid-May into September.

Habitat: Moist soils along streams, thickets, roadsides, waste places. Also found at the brackish upland edge of salt marshes.



JEWELWEED
(A.K.A Spotted-Touch-Me-Not)
Impatiens capensis

Height: Medium to tall (2-5 feet tall).

Leaves: Simple, alternate, course-toothed, fleshy leaves.

Flowers: Few to several orange or orange-yellow three-petaled tubular flowers with reddish brown spots and curved spur at end. Flowers June through September.

Habitat: Tidal fresh marshes, slightly brackish marshes, stream banks and upper wet borders of salt marshes. This plant is generally found in association with poison ivy.

Courtesy Web of Species at Wellesley College

PURPLE LOOSESTRIFE
Lythrum salicaria

Height: Medium height (2-6 feet tall). Square, almost woody stems.

Leaves: Opposite, lance-shaped, often with heart-shaped bases somewhat clasping stem sometimes in whorls of threes.

Flowers: Purplish and on a spike. Flowers from June through September.

Habitat: Inland and coastal fresh marshes, wet meadows, borders of rivers and lakes and tidally-restricted salt marshes.

THIS PLANT IS EXOTIC AND INVASIVE!

RUGOSA ROSE
Rosa rugosa

Height: Medium height (3-5 ft high).

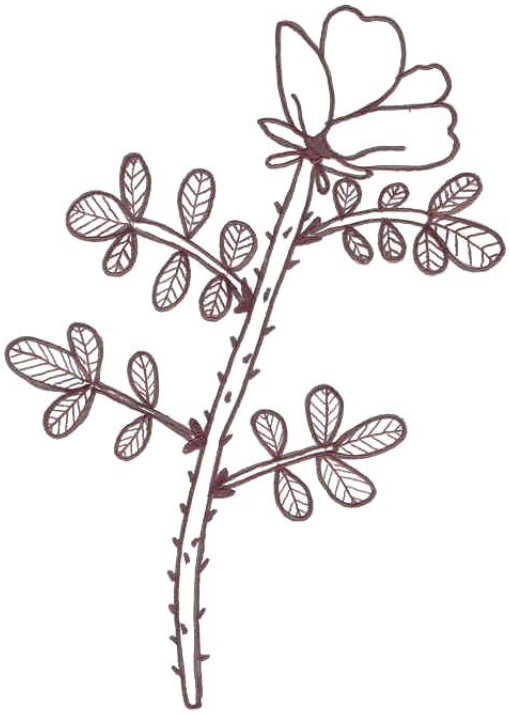
Leaves: Dark green shiny leaflets. Upper branches covered with dense bristles.

Flowers: Large, pink, purple, or white flowers from June through October.

Habitat: Salt marsh border, thickets, sand dunes.

Value: Rose hips provide food for birds and wildlife.

Similar Species: Swamp Rose *(Rosa palustris)* which grows in tidal fresh marshes, inland forested and shrub wetlands. Swamp Rose has smaller and more numerous flowers and fruit.



Courtesy NOAA Photo Library

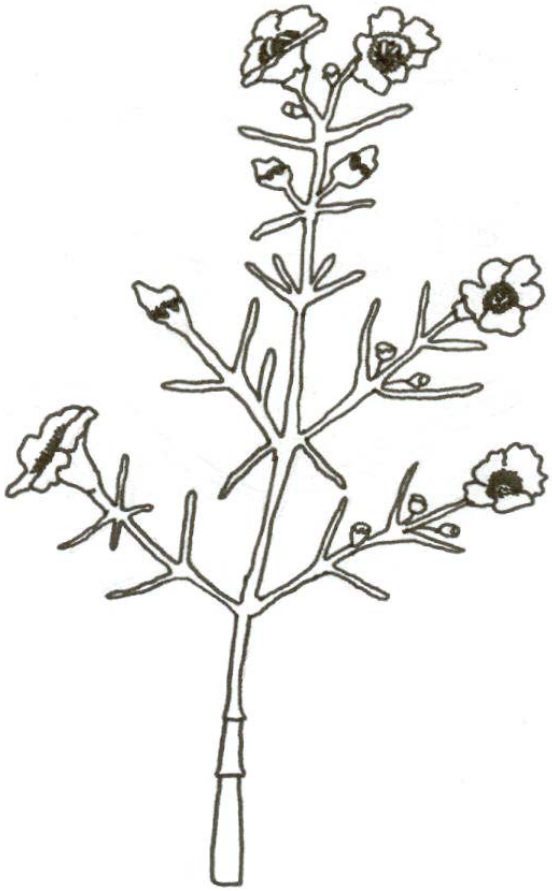
SEASIDE or SALTMARSH GERARDIA
Agalinis maritima

Height: Low and medium height (often 4 inches tall but sometimes up to 14 inches).

Leaves: Mostly opposite, fleshy or succulent leaves.

Flowers: Small pink to purple five-lobed bell-shaped flowers grow in pairs of 2 to 5, and flower from the bottom up. Flowers mid July to October.

Habitat: Irregularly flooded salt and brackish marshes, often in pannes on the high marsh.



THIS IS A RARE & THREATENED PLANT OF NEW HAMPSHIRE.

According to the NH Natural Heritage Program, Saltmarsh Gerardia is threatened in New Hampshire. Or 18 locations, only 15 have been verified since 1980. Populations in the state range from just a few plants to more than 1,000 at the best locations.

It is rare in New Hampshire because it is near the northern extent of its range. The shorter growing season and colder temperatures reduce the plants' ability to thrive in New Hampshire. Habitat loss is also a factor.

PERENNIAL SALT MARSH ASTER
Aster tenufolius

Height: Medium height (6 inches to 2 1/4 feet tall).

Leaves: Fleshy, linear, sometimes narrowly lance-shaped leaves, few in number. Upper leaves smaller than lower leaves.

Flowers: Pale purple, blue or white daisy-like flowers in heads with 15-25 petal-like rays. Flowers August through October.

Habitat: Irregularly flooded high marsh. Also found in brackish marshes, or upland edge of saltmarshes.

Similar Species: Annual salt marsh aster *(Aster subulatus)* occurs in similar habitats, but its flower heads are smaller, its flowers have very short purplish rays, and it is an annual with a short taproot.

Photos courtesy of
Alyson Eberhardt

SEA LAVENDER
(A.K.A Marsh Rosemary)
Limonium nashii

Height: Low height (8-24 inches tall).

Leaves: Leaves stemming from the base of the plant are lance-shaped to spoon-shaped, and taper at the base.

Flowers: Numerous, minute lavender five-lobed tubular flowers borne on a single stalk. Widely branched. Flowers July through September.

Habitat: Irregularly flooded high marsh.

SEASIDE ARROW GRASS
Triglochin maritima

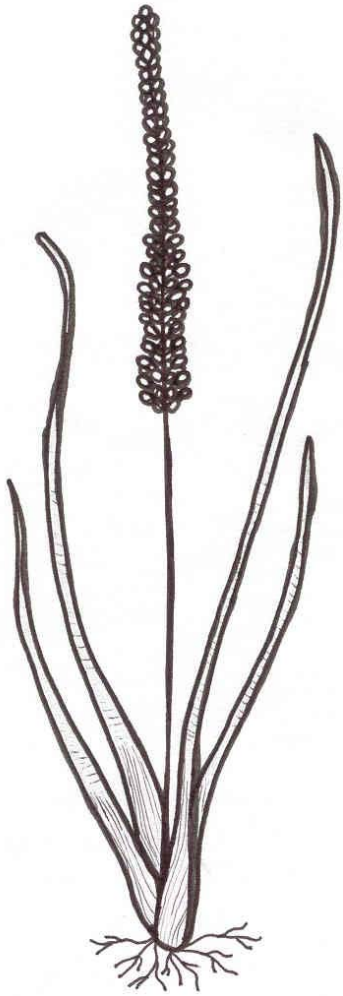
Height: Low to medium height. Leaves usually < 1 ft tall, with flowering stems taller.

Leaves: Fleshy leaves (up to 20 inches long) with sheaths.

Flowers: Numerous small green flowers. Flowers May through August.

Habitat: Irregularly flooded salt and brackish marshes.

Similar Species: The leaves of *Plantago oliganthos* (Seaside Plantain) are similar but lack leaf sheaths and appear to form a basal rosette. Seaside Plantain also grows in shallow pannes on the high marsh. Its succulent leaves are an edible herb during the summer.



SEASIDE GOLDENROD
Solidago sempervirens

Height: Medium to tall height (usually 3-4 feet tall).

Leaves: Alternate, thick, fleshy. Lance-shaped or oblong. Decreasing in size toward the top of the stem.

Flowers: Numerous yellow flowers grow on stalks. Flowers August through October.

Habitat: Irregularly flooded salt, brackish and tidal fresh marshes, marsh borders, sand dunes and beaches.

Value: The seeds and foliage are occasionally eaten by some song birds and small animals.

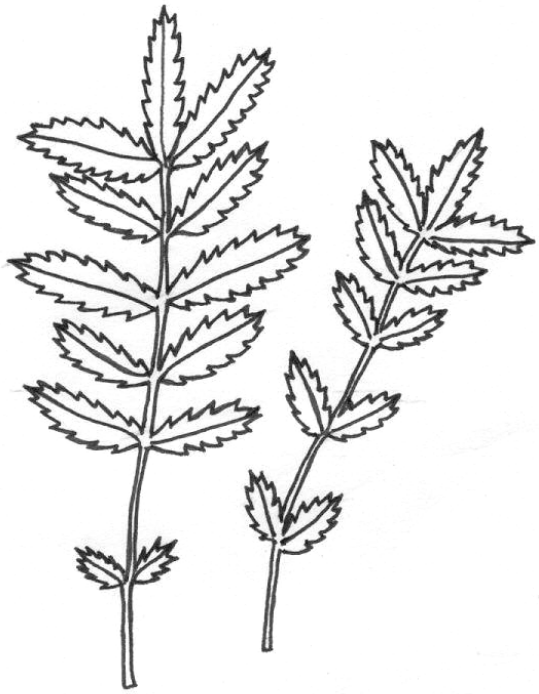
SILVERWEED
Potentilla anserina

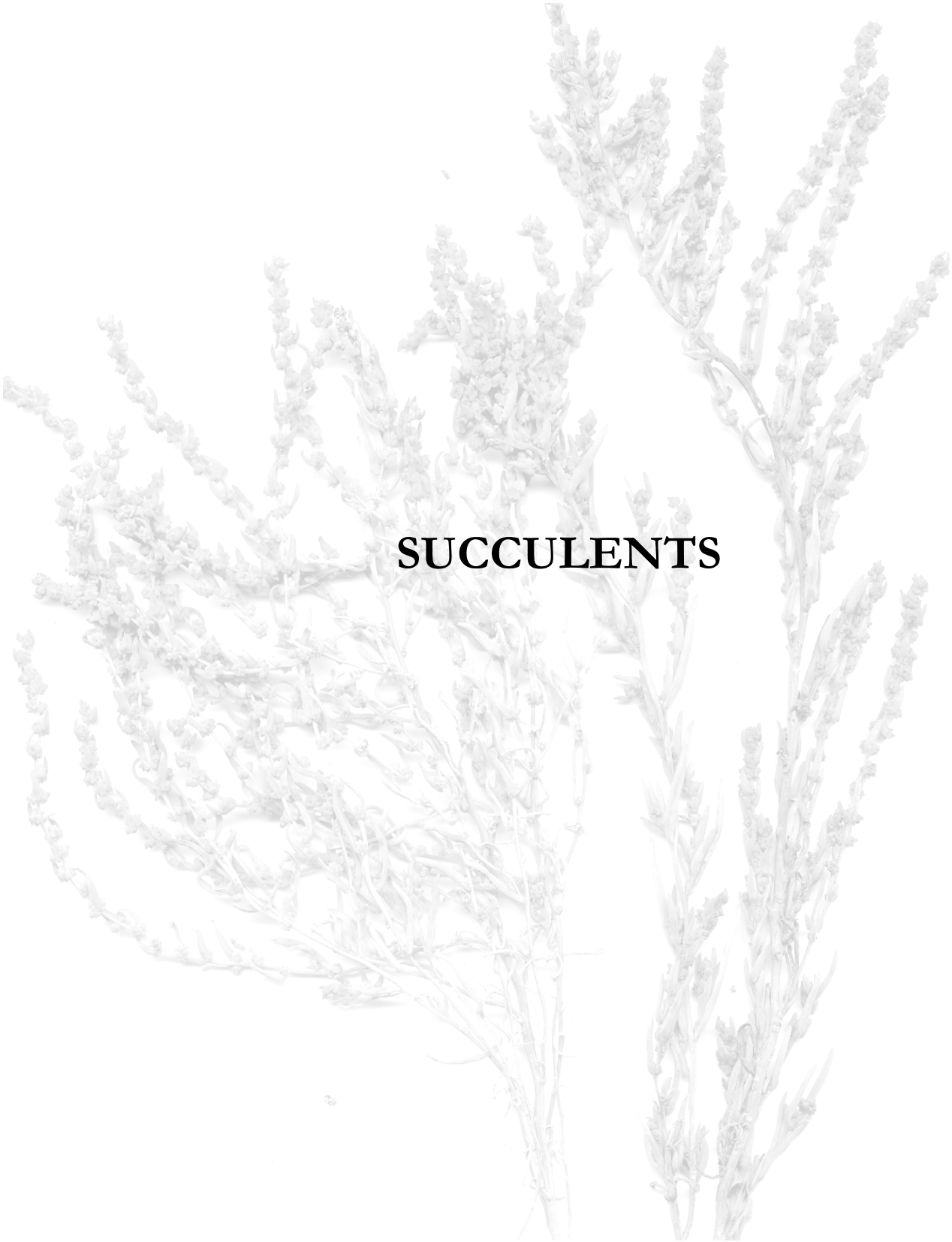
Height: Low, creeping (up to 1 foot tall).

Leaves: Basal leaves with seven or more sharply toothed leaflets are silver on underside.

Flowers: Yellow, five-petaled on a leafless stalk. Flowers May through September.

Habitat: Irregularly flooded salt and brackish marshes, marsh border, and wet sandy beaches.





SUCCULENTS

ATLANTIC SEA-BLITE
Sueda linearis

Height: Low to medium height (8-32 inches tall).

Leaves: Fleshy leaves are usually flat on one side and rounded on the other. Upper leaves smaller than bottom leaves.

Flowers: Tiny, greenish, in small clusters at the base of many upper leaves. Flowers August to October.

Habitat: Regularly and irregularly flooded salt marsh, often in sandy pannes.

Similar Species: Another sea blite (*Sueda maritima*) is larger growing, weakly erect or creeping (rarely over 12 inches tall); its leaves are pale green and usually whitened.

Top photo courtesy of Alyson Eberhardt

COMMON GLASSWORT
Salicornia europaea

Height: Low groundcover (up to 1 ½ ft tall). Fleshy, conspicuously jointed stems upright or sprawly; often bright red in autumn.

Leaves: Spikes usually less than 3/16 inch in diameter, the sections between their joints as long as thick, or longer.

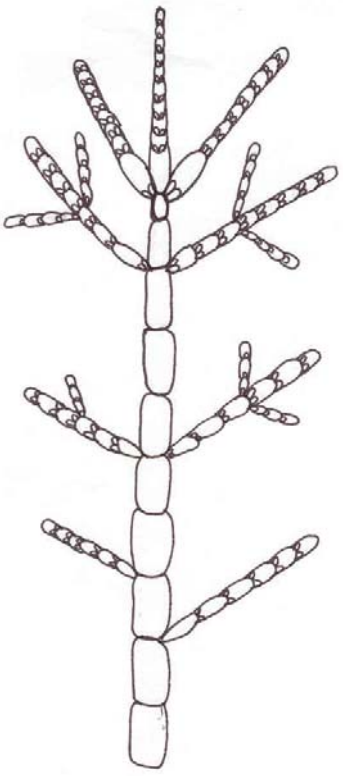
Habitat: Salt marshes, usually in pannes or disturbed areas.

Value: Stems are edible and serve as food for waterfowl, geese and ducks. Also edible to humans (when green only).

Similar Species: Biegelow's Glasswort *(Salicornia bigelovii)* has sharp-tipped scales below the spikes, thicker spikes, and does not have creeping lower branches.

Common Glasswort during summer

Common Glasswort during autumn



MARSH ORACH
(A.K.A Spearscale)
Atriplex patula

Height: Low to medium height (up to 3 ½ ft long or tall).

Leaves: Triangular shaped and fleshy.

Flowers: Very small green flowers grow on ball-shaped clusters on open, nearly leafless spikes at upper leaf nodes. Flowers July to November.

Habitat: Brackish marshes and along upper low marsh and in previously disturbed areas.

Similar Species: Goosefoot *(Chemopodium viburnum)* is sometimes found at upper borders of salt and brackish marshes. It has egg-shaped leaves that are irregularly toothed.

SALTMARSH PLANTAIN
Plantago maritima

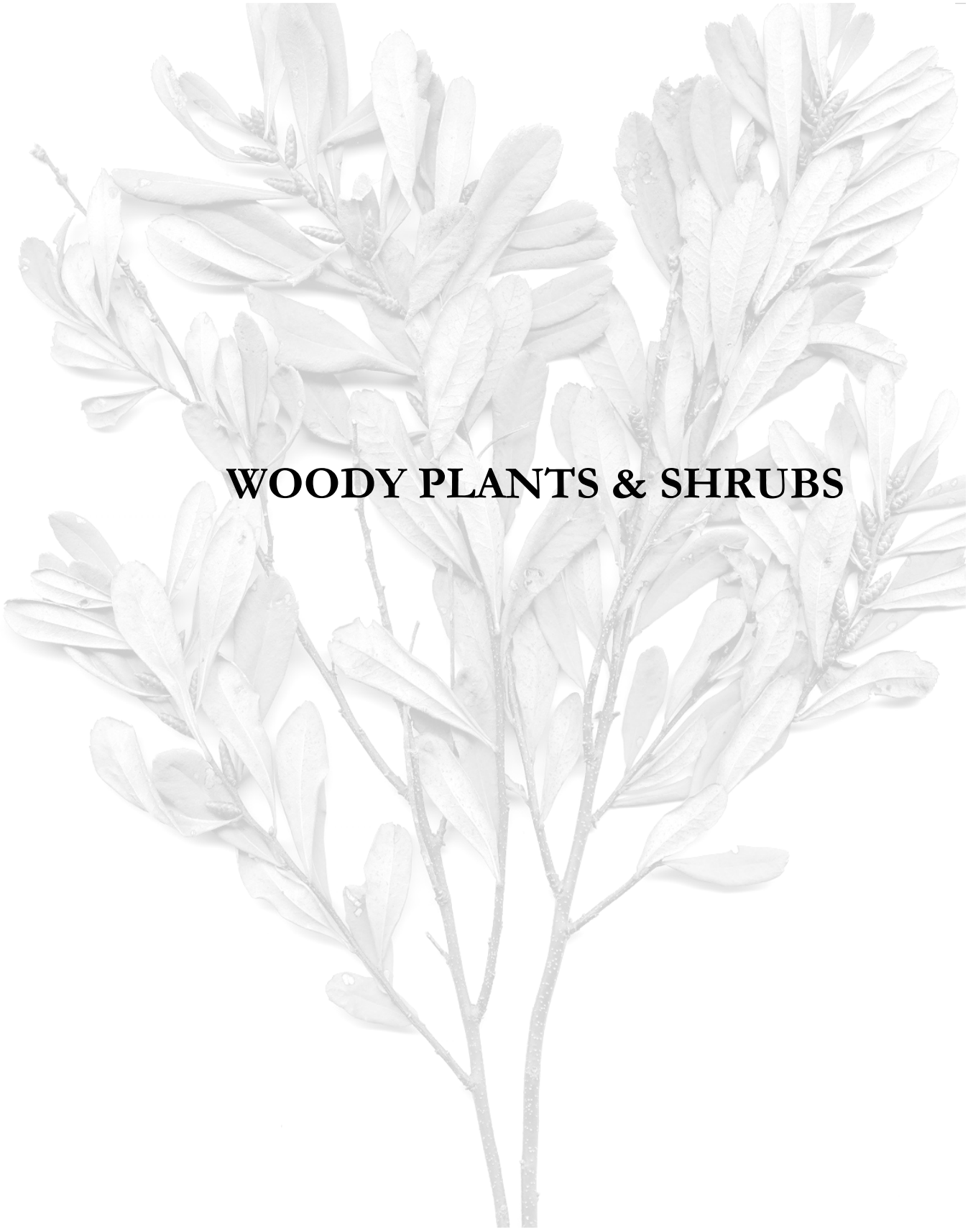
Height: Low-growing (up to 12 inches tall).

Leaves: Fleshy leaves originating from the base of the plant and are linear to narrow-shaped, tapering to a point.

Flowers: Several to many small whitish or greenish flowers that grow on a separate stalk (up to 12 inches long).

Habitat: Irregularly flooded salt marshes (common in pannes), beaches, rocky shores.

Similar Species: Fleshy basal leaves of Seaside Arrow Grass (Triglochin maritima). This plant is much taller in height and has rounded leaves, while the leaves of Saltmarsh Plantain tend to be triangular in shape.



WOODY PLANTS & SHRUBS

BAYBERRY
Myrica pensylvanica

Height: Low to medium height (3-5 ft tall)

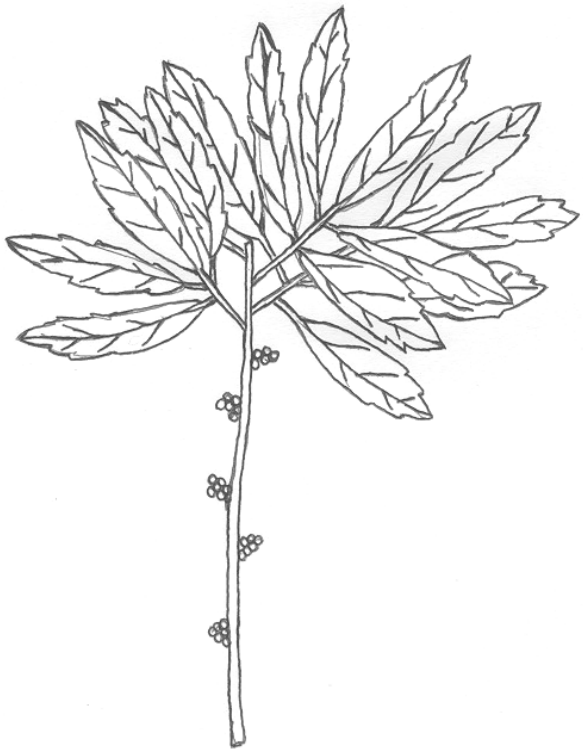
Leaves: Oblong to lance-shaped to egg-shaped.

Flowers: Waxy ball-like fruits that often persist through winter and grow on clusters along twigs below leafy twigs.

Habitat: Upper marsh border, inland marshes, shallow waters.

Value: Provides cover and food for songbirds, waterfowl, shorebirds, and marshbirds. The berries are the source of the aromatic wax used in making bayberry-scented candles and some industrial deodorants.

Similar Species: Can be confused with Sweet Gale *(Myrica gale)* but the leaves of Bayberry are generally broader than sweet gale and the twigs of sweet gale bear nutlets/flowers at their tip.



MEADOWSWEET
Spiraea latifolia

Height: Low to medium height (3-5 ft tall).

Flowers: Pyramidal terminal cluster of small, white or pale pinkish flowers.

Habitat: Marsh border, meadows.

Similar Species: Resembles Steeplebush *(Spiraea tomentosa)* but has reddish-brown stems and pale colored flowers. The underside of Steeplebush leaves are whitish, while Meadowsweet are not.

Poison Ivy during the summer
Copyright Dr. Mark H. Brand, University of Connecticut Plant Database

POISON IVY
Toxicodendron radicans or Rhus radicans

Height: Erect deciduous shrub, trailing vine, or climbing plant. Shrub can grow up to 6 ft tall, but this plant is taller as a vine.

Leaves: Long-stalked compound leaves divided into three leaflets, each leaflet having a longer stalk than the side leaflets.

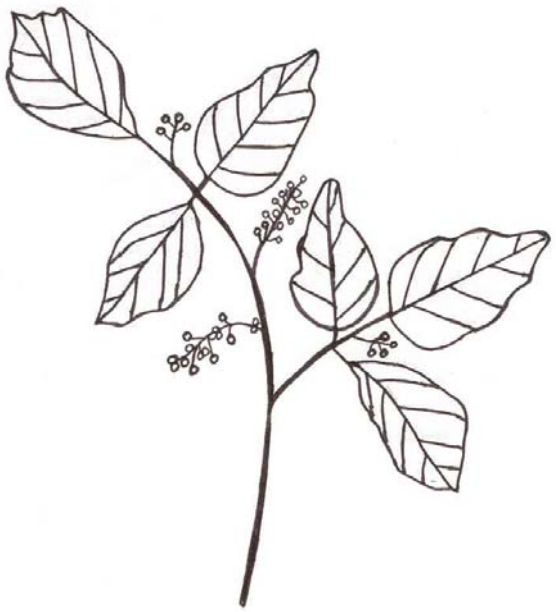
Flowers: Small yellowish flowers with five petals borne on lateral clusters. Fruits small grayish white balls also borne on clusters. Flowers May through July.

Habitat: Tidal fresh marshes and salt marsh border.

CAUTION!

THIS PLANT CAUSES SKIN IRRITATION.
DO NOT TO TOUCH ANY PART OF THIS PLANT.

Poison Ivy during the autumn



SWEET GALE
Myrica gale

Height: Low to medium height (up to 5 ft tall).

Leaves: Oblong, lance-shaped, with tapering wedge-shaped bases. Fragrant when crushed.

Flowers: Grow in dense clusters at the top of the previous year's twigs. Flowers April into June.

Habitat: Upper marsh border, inland marshes, shallow waters.

Similar Species: Can be confused with Bayberry but leaves of Sweet Gale are smaller, and twigs bear nutlets/flowers at their tips.

FISH, CRABS, & SHRIMP

MUMMICHOG
Fundulus heteroclitus

Coloration

- **Male (Non Breeding Season):** Dark green to steel-blue with white or yellow mottling and narrow, irregular silvery bars on the side. Underside is white or pale yellow. Dorsal and caudal fins are dark green or dusky with pale mottling. Sometimes there is a dark eyespot on the rear of the dorsal fin.
- **Male (Breeding Season):** Pigmentation is intensified. Back and upper sides darkening almost to black, while yellow of underside becomes more brilliant and body takes on a steel-blue reflection.
- **Female:** Much paler than the male. Uniform olive to bottle-green, dark above and lighter below. Do not have definite markings though their sides often show faint and indefinite cross bars of a deeper tone of the same hue. Fins much paler.
- **Juvenile:** Both sexes have dark transverse bars on their sides.

Male mummichog (top) and female mummichog (bottom) courtesy of Alyson Eberhardt.

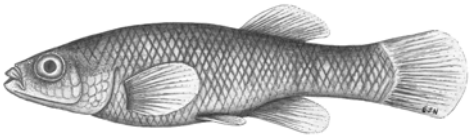
Other Descriptors

- **Body:** Chunky/Stout. Thickest just in back of the pectoral fins; tapering to the tail.
- **Top of Head:** Flat between the eyes
- **Snout:** Blunt
- **Mouth:** Small and at tip of snout. Does not gape back to eye.
- **Eyes:** Large
- **Fins:** No spines
- **Scales:** Large plate-like and rounded
- **Dorsal (Top) Fin:** Behind the middle of the body and over anal fin
- **Pectoral Fin:** Broad and rounded
- **Tail (Caudal) Fin:** Rounded

Male

Source: The Inland Fishes of New York State. 1985.
C. Lavett Smith. New York State Department of Environmental Conservation.

Female



Courtesy of Ethan Nedeau, BIODRAWVERSITY

Average Length

- **Adults:** 45 to over 100mm
- **Juvenile:** Under 45mm

Habitat

- Shallow areas of muddy pannes, open pools, creeks, and ditches of salt and brackish marshes. They are resistant to lack of oxygen, presence of carbon dioxide, and unfavorable surroundings and can thus survive very poor water. With the ebb of the tide they are trapped in little pools and pannes where they remain until the next tide if the water remains. If the pools dry, they will burrow into the mud. During the winter, they stay at the bottom of deeper pools and creeks, in approximately 6-8" in mud.

Feeding Habits

- They are omnivorous and consume small invertebrates, diatoms, or eelgrass.

Similar Species

Striped killifish *(Fundulus majalis)*. Female killifish are fairly easy to identify since it is the only fishwith horizontal stripes/bars (developed at about 30mm or so). The real trick is being able to identifythe male killifish and the female mummichog. The male killifish has darker, more pronouncedvertical bars and its head is more pointy and more streamlined than the male mummichog. Also,killifish have scales in front of their eyes, whereas the mummichogs do not. These scales are acharacteristic present in both sexes for each species (i.e. both the male and female *majalis*havepreorbital scales, *heteroclitus* does not).

STRIPED KILLIFISH
Fundulus majalis

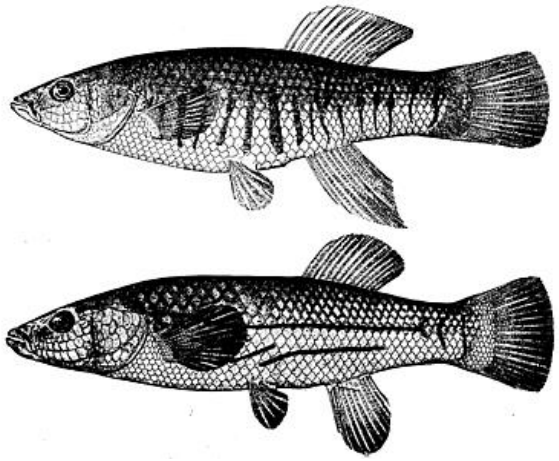
Coloration

- Color is paler than the Mummichog.
- **Male:** Vertical bars/stripes throughout life. Stripes increase from approximately 7-12 when young, to approximately 14-20 when adult. More brilliant during breeding season, back turning almost black and the underside turning orange or golden. Fins bright yellow.
- **Female:** Original vertical bars transformed with growth into 2-3 horizontal stripes on each side. Upper stripe is uninterrupted from gill opening to tail. Lower stripe is in two segments. One is close behind the pectoral to above the ventral. The other is backward to close behind the rear edge of the anal fin. Olive-green above; white below.
- Both sexes have a silvery appearance with black spot on the last ray of the dorsal fin

Courtesy of Charles A. Trainer - Institute of Science Inquiry

Other Descriptors

- **Body:** More slender than the Mummichog. Body tapers toward head and tail.
- **Top of Head:** Upper surfaces of their heads flattened
- **Snout:** Long, more pointed than the Mummichog
- **Mouth:** Terminal or protruding lower jaw
- **Scales:** Preorbital scales (scales in front of the eyes). This is a major distinguishing feature from *Fundulus heteroclitus*.
- **Tail (Caudal) Fin:** Rounded
- Lack of dorsal spine and lateral line



Average Length

- Larger than the Mummichog. Up to 130mm

Habitat

- Similar to the Mummichog; though keeps more strictly to salt water and found more often along open beaches.

Feeding Habits

- Exploit a larger niche than *Fundulus heteroclitus*. Eat small animals, mollusks, crustaceans, fish, insects, and insect larvae.

Similar Species

- Mummichog *(Fundulus heteroclitus)*.Female killifish is fairly easy to identify. It is the only fish with horizontal stripes/bars(developed at about 30mm or so). The real trick is being able to identify the male killifish and the female mummichog. The male killifish has darker, more pronounced horizontal bars and its head is more pointy and streamlined than the female mummichog. The male killifish also has scales in front of its eyes, whereas the female mummichog does not.

ATLANTIC SILVERSIDE
Menidia menidia

Coloration

- **Backside/Top:** Translucent gray-green
- **Underside/Bottom:** Rounded white underside.
- **Side:** Upper parts of sides thickly speckled with dark brown. Silver band outlined above by a narrow black stripe running along each side, from close behind the pectoral fin to the base of the caudal fin.

Courtesy of Alyson Eberhardt

Other Descriptors

- **Body:** Slender/Thin
- **Top of Head:** Short head
- **Mouth:** Small
- **Eyes:** Large
- **Scales:** Large scales with smooth margins
- **Dorsal (Top) Fin:** 2. First: 3-7 spines, originates halfway between the tip of the snout and base of the caudal fin. Second: 7-10 spikes and originates over the middle of the anal fin.
- **Tail (Caudal) Fin:** Moderately forked

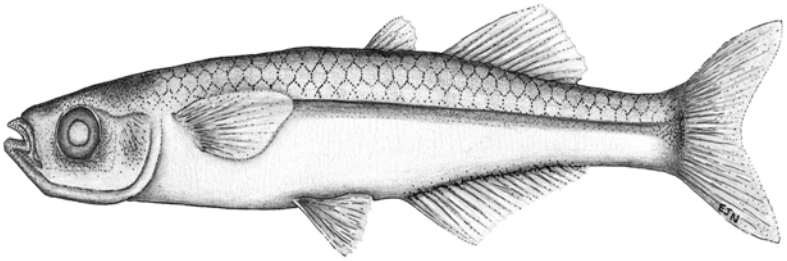
Courtesy of Charles A. Trainer - Institute of Science Inquiry

Average Length

- Up to 150mm

Habitat

- Sandy, gravelly shores. Inner bays, river mouths, brackish waters swimming among the submerged grasses. Rarely found in water deeper than a few feet in summer, but will descend to greater depths in the winter to avoid the cold temperatures of the water.



Courtesy of Ethan Nedeau, BIODRAWVERSITY

Feeding Habits

- This omnivorous fish feeds on zooplankton, copepods, shrimp, amphipods, young squid, worms, and even insects and algae.

NINESPINE STICKLEBACK
Pungitius pungitius

Coloration

Courtesy of Alyson Eberhardt

- **Backside/Top:** Dull olive, brown, black
- **Underside/Bottom:** Silver
- **Side:** Upper parts of sides faintly barred or blotched darker.
- Color varies with season of the year, state of sexually maturity, and with color of bottom on which the fish is living. Those on dark mud are darker; those on bright sand are paler.
- All become more brilliant during breeding season. A reddish tint appears under the head, underside turns greenish, black dots develop here and there over entire body.

Other Descriptors

- **Body:** Slender
- **Scales:** None
- **Dorsal (Top) Fin & Anal Fin:** Former stands above latter – alike in form tapering from front to rear. Anal preceded by a single stout recurved spine.
- **Tail (Caudal) Fin:** Weakly rounded

Average Length

- Up to 76 mm.

Habitat

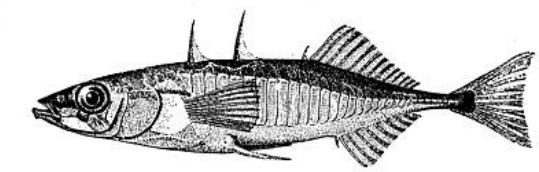
- Estuaries, salt marshes. Uses spines as weapons of offense and defense.

Feeding Habits

- Omnivorous. Feed on invertebrates, small fish, fish eggs, copepods, isopods, shrimp.

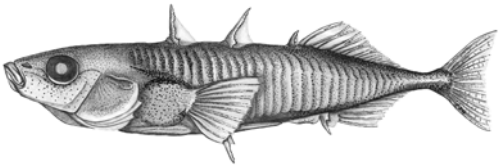
OTHER STICKLEBACKS

THREESPINE STICKLEBACK
Gasterosteus aculeatus



Courtesy of Northeast Fisheries Science Center

FOURSPINE STICKLEBACK
Apeltes quadracus



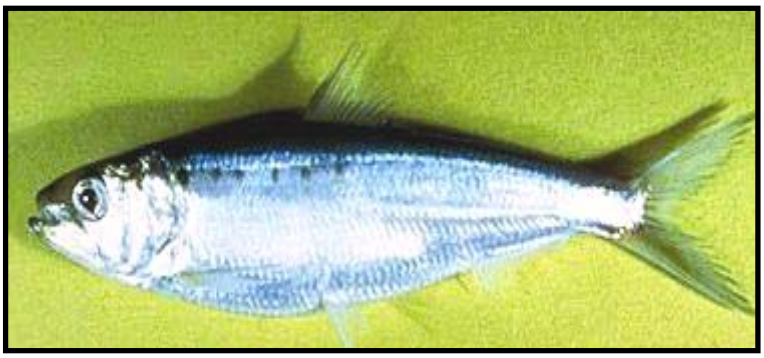
Courtesy of Ethan Nedeau, BIODRAWVERSITY

Quick Key to Identifying Sticklebacks

- **Dorsal Spines:** 7 or more = Ninespine Stickleback
- **No Boney Plates:** None on upper part of the sides, but bony ridge on either side of abdomen (triangular in cross section) = Fourspine Stickleback
- **Flat Belly/Sharp Back:** Fourspine Stickleback
- **Many Bony Plates:** (28 or more) plates on each side = Threespine Stickleback

HERRING
Alosa spp.

Coloration

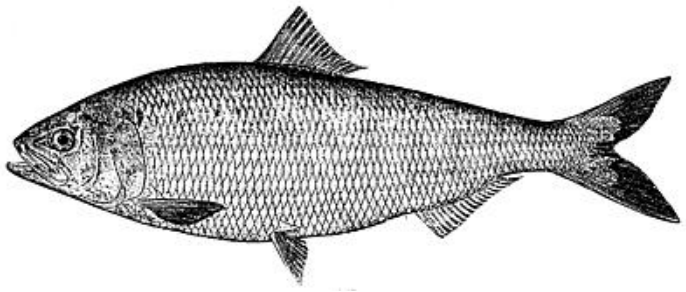


Courtesy of NorthEast Fisheries Science Center

- **Backside/Top:** Iridescent deep steel blue or greenish blue on the backside/top with green reflections
- **Underside/Bottom:** Iridescent silver
- **Side:** Iridescent silver
- **Gill Covers:** Golden or brassy gloss
- **Ventral and Anal Fins:** Translucent white
- **Pectoral Fins:** Dark at base and along upper edge
- **Caudal and Dorsal Fins:** Dark grayish, shading into green or blue

Other Descriptors

- **Body:** Flat, elongate and compressed. Underside is sharp-edged
- **Snout:** Moderately pointed
- **Mouth:** Large jaw angled upward. Teeth on lower jaw in young.
- **Eyes:** Large
- **Fins:** Blue-black spot near edge of gill openings, with one or two smaller spots after it
- **Scales:** Large and loosely attached. Rear margins are rounded.
- **Dorsal (Top) Fin:** Small. Stands over much smaller ventrals and originates about midway the length of the body.
- **Tail (Caudal) Fin:** Deeply forked with lobes
- **Anal Fin:** Longer than dorsal fin



Average Length

- Approximately 200 mm

Habitat

- Schooling fish found in open waters of the ocean and large rivers, reservoirs and lakes.
- Like cooler waters and tend to stay in deep water in the open water column

Feeding Habits

- Young feed on small crustaceans and aquatic insects in fresh water
- In salt water, they feed on shrimp
- Adults mainly eat plankton
- Diet includes algae, zooplankton, mayflies, mollusks, fish eggs, and fish

Similar Species

- Herring can be Alewife *(Alosa pseudoharengus)* or American Shad *(Alosa sapidissima)*

GREEN CRAB

Carcinus maeneus

A.K.A European Shore Crab

THIS CRAB IS EXOTIC & INVASIVE!

Since making their way from Europe to the Eastern Coast of the United States in the 18th century (and more recently to the West Coast). They have caused widespread problems by taking over the range and habitat or native blue crabs.

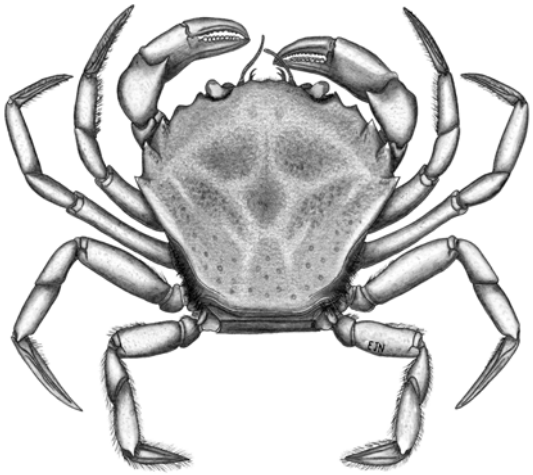
Description

- **Color:** Not usually green in color, but rather mottled. Abdomen contains yellow patches
- **Mottling:** May change from green to orange to red
- **Carapace (Abdomen) Shape:** Wider at head, tapering
- **Spines on Carapace (Abdomen):** 5 spines on either side
- **Legs:** Unbanded but spotted
- **Hind Walking Legs:** Relatively flat

Courtesy of Fisheries & Oceans Canada

Average Length

- **Growth:** Rapid. They may molt as frequently as every 30 days, increasing their size by around 30 percent.
- **Native Range:** Up to 86 mm
- **North America:** Up to 110 mm



Courtesy of Ethan Nedeau, BIODRAWVERSITY

Habitat

- Marine embayments and estuaries, where they migrate between the subtidal and intertidal zone.
- Seagrass areas yet also non-vegetated clean sandy substrate, or mud.
- Do not live on exposed, rocky or sandy open coastlines.

Feeding Habits

- Bivalve shellfish. Work overseas suggests that the crabs have wrecked havoc on native bivalve populations, destroyed local fisheries and wiped out aquaculture ventures.

ASIAN (JAPANESE) SHORE CRAB
Hemigrapsus sanguineus

THIS CRAB IS EXOTIC & INVASIVE!

This Japanese import was released from ballast water in New Jersey around 1987 and has since pushed its way north into Massachusetts and south into North Carolina. An omnivore with an appetite for young clams, scallops, oysters, algae, fish larvae, and many other species, these crabs may well pose a threat to New England ecosystems and aquaculture operations. The Japanese Shore Crab has been found to compete with other exotic crabs.

Description

- **Color:** Depending on its location, color mottling can range
- **Mottling:** Green to purple to orange-brown to red
- **Carapace (Abdomen) Shape:** Square
- **Spines on Carapace:** 3 spines on either side
- **Legs:** Light and dark red bands
- **Claws:** Red spots. Male has distinctive fleshy, bulb-like structure at base of moveable finger
- **Hind Walking Legs:** Somewhat round

Average Length

- **North America:** 35 – 42 mm

Habitat

- Shallow, hard-bottomed intertidal areas, artificial structures, under rocks. Can tolerate a large range of salinities and temperatures.

Feeding Habits

- Omnivorous. Broad diet of macroalgae, salt grass, larval and juvenile fish, small invertebrates such as amphipods, gastropods, bivalves, barnacles, and polychaetes.

SHORE/GRASS SHRIMP
Palaemonetes vulgaris

Description


(©Carol & Mark Archambault)

- **Abundance:** Most common
- **Body Shape:** Somewhat rounded
- **Body Color:** Transparent gray
- **Mottling:** Red, yellow, and blue spots
- **Rostrum (Horn):** Serrated, well-developed extending over the eyes
- **Telson (Tail Piece):** Spiny
- **Walking Legs:** First two pair have obvious claws

Average Length

- Up to 50 mm

Habitat

- Estuarine waters, beds of submerged vegetation

Feeding Habits

- Omnivorous. Larvae feed on zooplankton and algae; adults feed on algae, marine worms, and other crustaceans.

SAND SHRIMP
Crangon septemspinosa

Description


(©Carol & Mark Archambault)

- **Abundance:** Less abundant, but still common
- **Body Shape:** Flattened from top to bottom
- **Body Color:** Transparent to pale grey or brown
- **Mottling:** Many irregular, tiny, star-shaped black spots
- **Rostrum (Horn):** Short
- **Telson (Tail Piece):** Often blackish
- **Walking Legs:** First pair heavy with backward-bending hook-like claw at tip. Second and third are very slender

Average Length

- Up to 70mm

Habitat

- Estuarine waters, beds of submerged vegetation

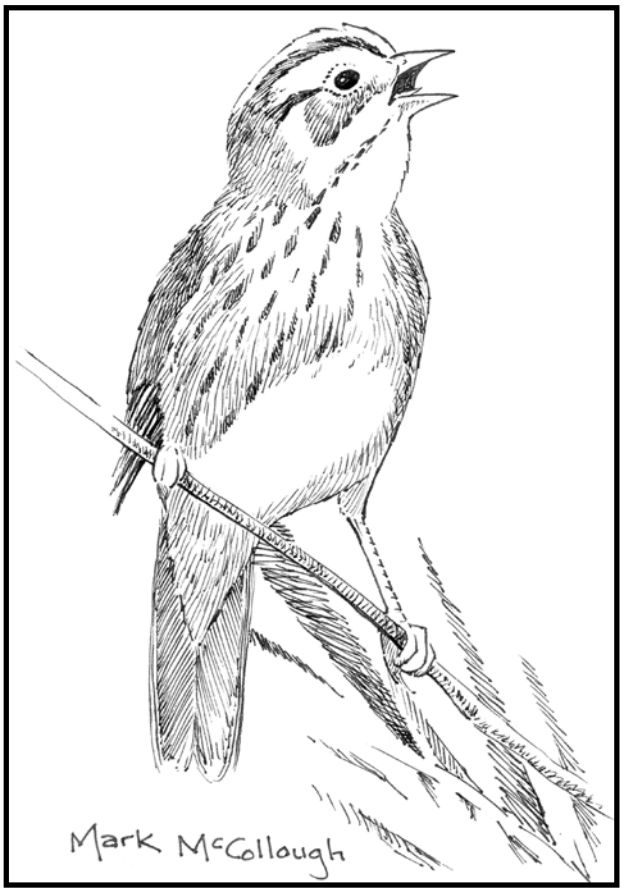
Feeding Habits

- Omnivorous. Feed on invertebrates, organic debris, and larval fish.

THE SALT MARSH SHARP-TAILED SPARROW*

Wetland birds require certain types of habitats for different aspects of their lives such as nesting, feeding, perching, or migration. Salt marshes offer a variety of habitats such as mudflats, pannes, pools, various types of vegetation, and open water. Birds have evolved a variety of adaptations to exploit the resources in these habitats. Habitat diversity in salt marshes results from a variety of physical, chemical, and biological variables. Alterations to physical variables such as hydrology, chemical variables such as salinity, or biological variables such as vegetation will affect the type and distribution of habitats in a salt marsh, and therefore the biological communities that can live there.

Humans may alter the habitat that a bird requires. For example, the Salt-Marsh Sharp-Tailed Sparrow requires suitable densities of *Spartina patens* (salt meadow cord grass) and *Spartina alterniflora* (smooth cordgrass) for nesting and feeding, and alterations to natural hydrology or salinity regimes may reduce availability of these vegetation types.



Description (Adult - Both Sexes)

- **Length:** 5 inches
- **Bill:** Large, conical
- **Head:** Large, flat
- **Tail:** Short
- **Face:** Orange
- **Cheek:** Grey
- **Throat:** White
- **Crown:** Grey
- **Breast:** Buffy; sides with dark streaks
- **Belly:** White
- **Wings:** Brown
- **Streaking:** Dark and light on back

Description (Juvenile)

Similar to adult but has buffier underparts with less streaking and browner, not gray, upper parts

Information taken directly from "*A Volunteer's Handbook for Monitoring New England Salt Marshes*." Carlisle, B.K., A.M. Donovan, A.L. Hicks, V.S. Kooken, J.P. Smith, and A.R. Wilbur. 2002. Massachusetts Office of Coastal Zone Management, Boston, MA.

Salt Marsh Birds In New Hampshire

Common Name	Latin/Scientific Name	AOU
American Black Duck	*Anas rubripes*	AMBL
American Crow	*Corvus caurinus*	AMCR
American Goldfinch	*Carduelis tristis*	AMGO
American Robin	*Turdus migratorius*	AMRO
Bank Swallow	*Riparia riparia*	BANS
Barn Swallow	*Hirundo rustica*	BARS
Belted Kingfisher	*Ceryle alcyon*	BEKI
Black-capped Chickadee	*Parus atricapillus*	BCCH
Black-crowned Night Heron	*Nycticorax nycticorax*	BCNH
Black Rail	*Laterallus jamaicensis*	BLRA
Blue Jay	*Cyanocitta cristata*	BLJA
Blue-wing Teal	*Anas discors*	BWTL
Bobolink	*Dolichonyx oryzivorus*	BOBO
Brown-headed Cowbird	*Molothrus ater*	BHCO
Canada Goose	*Branta canadensis*	CAGO
Chimney Swift	*Chaetura pelagica*	CHSW
Clapper Rail	*Rallus longirostris*	CLRA
Common Grackle	*Quiscalus quiscula*	COGR
Common Tern	*Sterna hirundo*	COTE
Common Yellow Throat	*Geothylpis trichas*	COYE
Double-crested Cormorant	*Phalacrocorax auritas*	DCCO
Eastern Kingbird	*Tyrannus tryrannus*	EAKI
European Starling	*Sturnos vulgaris*	EUST
Gray Catbird	*Dumetella carolinensis*	GRCA
Great Blue Heron	*Ardea herodias*	GBHE
Great Egret	*Ardea alba*	GREG
Great Black-backed Gull	*Larus marinus*	GBBG
Greater Yellowlegs	*Tringa melanoleuca*	GRYE
Green-wing Teal	*Anas carolinensis*	GRWT
Green Heron	*Butorides striatus*	GRHE
Herring Gull	*Larus argentatus*	HEGU
King Rail	*Rallus elegans*	KIRA
Least Bittern	*Ixobrychus exilis*	LEBI
Least Sandpiper	*Calridris minutilla*	LESA
Laughing Gull	*Larus atricilla*	LAGU
Least Tern	*Sterna albifrons*	LETE
Mallard	*Anas platyrhynchos*	MALL
Marsh Wren	*Cisthorus palustris*	MAWR
Mourning Dove	*Zenaida macroura*	MODO
Nelson's Sharp-tailed Sparrow	*Ammodramus n. subvirgatus*	NSTS
Northern Cardinal	*Cardinalis cardinalis*	NOCA
Northern Harrier	*Cricus caneus*	NOHA
Osprey	*Pandion haliaetus*	OSPR
Purple Martin	*Progne subis*	PUMA
Red-tailed Hawk	*Buteo jamaicensus*	RTHA
Red-winged Blackbird	*Agelaius phoeniceus*	RWBL
Ring-billed Gull	*Larus delawarensis*	RBGU
Rough-winged Swallow	*Stelgidopteryx ruficollis*	NRWS
Saltmarsh Sharp-tailed Sparrow	*Ammodramus c. caudacutus*	SSTS
Savannah Sparrow	*Passerculus sandwichensis*	SASP
Seaside Sparrow	*Ammodramus maritima*	SSSP
Semipalmated Sandpiper	*Calidris pusilla*	SESA
Sharp-shinned Hawk	*Accipiter striatus*	SSHA
Short-billed Dowitcher	*Limnodromus griseus*	SBDO
Snowy Egret	*Egretta thula*	SNEG
Song Sparrow	*Melospiza melodia*	SOSP
Spotted Sandpiper	*Actitis macularia*	SPSA
Swamp Sparrow	*Melospiza georgiana*	SWSP
Tree Swallow	*Tachycinets bicolor*	TRES
Turkey Vulture	*Cathartes aura*	TUVU
Virgina Rail	*Rallus limicola*	VIRA
Willet	*Catoptrophorus semipalmatus*	WILL
Willow Flycatcher	*Empidonax trailii*	WIFL

Recommended Plant Identification & Reference Guides

The Book of Swamp and Bog: Trees, Shrubs, and Wildflowers of Eastern Freshwater Wetlands
by John Eastman.

ISBN 0-8117-2518-9

A Field Guide to Coastal Wetland Plants of the Northeastern United States
by Ralph W. Tiner, Jr.

ISBN 0-870-23538-9

Freshwater Wetlands- A Guide to Common Indicator Plants of the Northeast
by Dennis W. Magee

ISBN 0-87023-317-3

Northeastern Wetland Flora: Field Office Guide to Plant Species
by USDA – NRCS/Northeastern National Technical Center, Chester Pennsylvania

Plants in Wetlands: A Redington Field Guide to Biological Interactions
by Charles B. Redington

ISBN 0-84038-983-3

Pond and Brook
by Michael J. Caduto

ISBN 0-87451-509-1

Pond Life: A Golden Guide
by George K. Reid

ISBN 0-30724-017-7

Through The Looking Glass
by Susan Borman, Robert Korth, Jo Temte

ISBN 0-93231-032-X

Wetland Planting Guide for Northeast United States
by Gwendolyn A. Thunhorst

ISBN 1-88322-602-3

Wetlands - National Audubon Society Nature Guides
by William A. Niering

ISBN 0-39473-147-6